Towards improved bioprocess operation: monitoring, modeling and control

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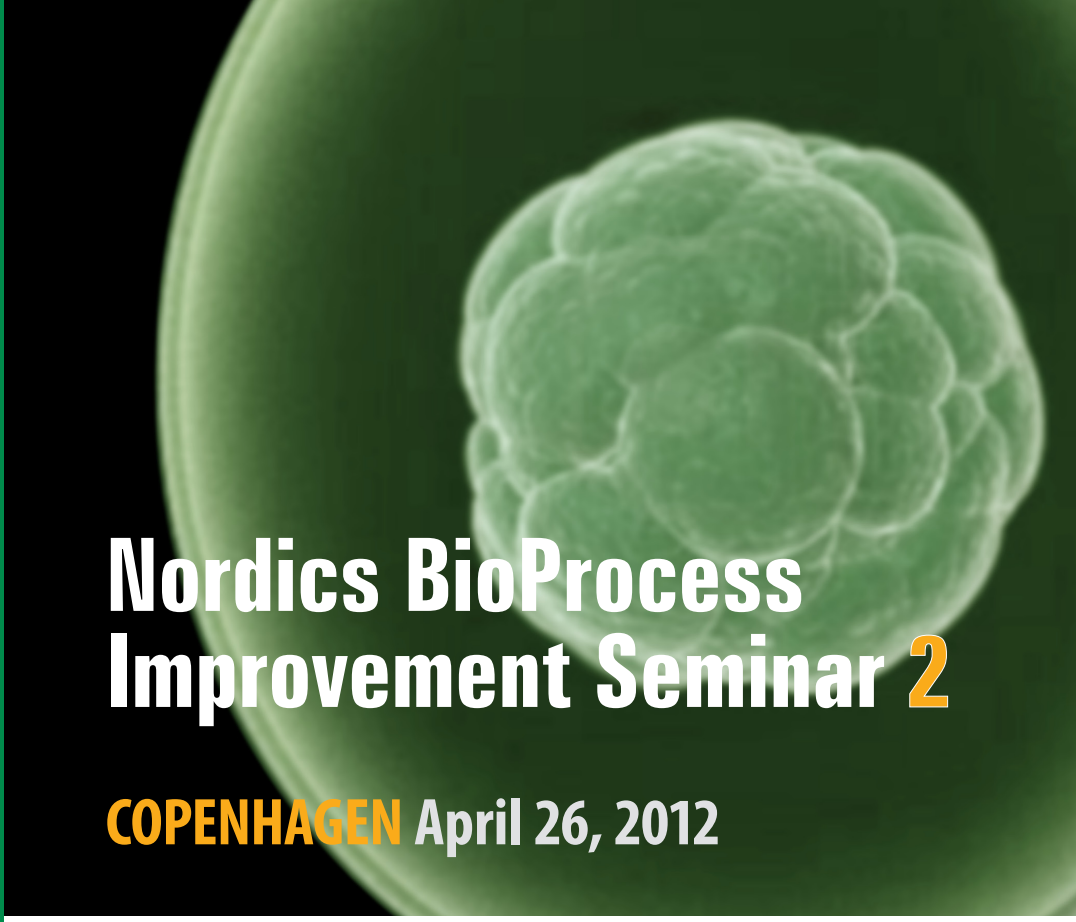

Nordics BioProcess Improvement Seminar 2

COPENHAGEN April 26, 2012

Process optimization from parallel micro bioreactors to large-scale bio-manufacturing

Interactive seminars for and by industrial and academic experts on the latest relevant developments in bioprocess innovation, with special focus on single-use technology and process intensification in upstream and downstream bioprocessing.

The low threshold opportunity for idea sharing, learning, networking and new partnerships building on bioprocessing improvement.

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ANL PRODUKTER AB
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BioProcess INTERNATIONAL

Nordics BioProcess Improvement Seminar 2

Time & Venue

Thursday, 26 th of April, 2012

Technical University of Denmark, Anker Engelunds Vej Building 223 (room 207-213), 2800 Kgs. Lyngby, DENMARK

Talks & Breaks

09.00-09.30	**Registration with coffee**
09.30-09.40	**Welcome**
09.40-10.40	❶ **Dr. Krist Gernaey, Dr. Anna Eliasson Lantz, Mads Albæk and Ulrich Krühne, DTU** *Towards improved bioprocess operation: monitoring, modeling and control*
	Short break
11.00-11.30	❷ **Dr. -Ing. Frank Kensy, m2p-labs** *High-throughput parallel bioprocessing in shaken microbioreactors –from clone screening to automated bioprocess development*
11.35-12.05	❸ **Dr. ir. Nico Oosterhuis, CELLution Biotech** *Mixing, mass transfer and bioprocess scaling up and down in new generation single-use bioreactors*
12.10-13.20	**Lunch**
13.25-13.40	❹ **MSc Ivana Dencic** *Exploring potential of enzymatic microreactors – enzyme immobilization and cost considerations (Ivana Dencic, Eindhoven University of Technology)*
13.40-14.10	❺ **Dr. Bram Bout, Bioceros** *Development of improved feed strategies for high performance cell cultures & online glucose/lactate measurement in a single-use system*
14.15-14.45	❻ **Dr. Nicolas Chaudet, Sanofi Pasteur** *Evaluation and application of single-use technologies with aerobic bacteria for upstream process intensification in the development of vaccines*
14.50-15.20	❼ **Christian Skjødt, CMC Biologics** *Disposable harvesting - designing a single-use approach for harvest clarification*
	Short break
15.30-16.00	❽ **Dr. Günter Jagschies GE Healthcare Life Sciences** *Future biologicals manufacturing, process integration with single-use technology*
16.05-16.35	❾ **Dr. Peter F. Pind Novozymes A/S / Alfa Laval** *Moving purification upstream in the recovery of proteins*
16.40-	**Coffee (or drinks) and general discussion**

Organizers: CELS Network/CEFFORT AB, ANL Life Sciences, Cellution Biotech, Bioprocess International

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Towards improved bioprocess operation: monitoring, modeling and control

Dr. Krist Gernaey, Dr. Anna Eliasson Lantz, Mads Albæk and Ulrich Krühne, DTU

Short outline:

- Overview of modeling approaches and recent developments, Krist V. Gernaey
- Application of computational fluid dynamics across reactor scales, Ulrich Krühne
- Case story – Modeling enzyme production with *Aspergillus oryzae*, Mads Orla Albæk
- The use of advanced monitoring techniques to guide development and optimization of fermentation processes, Anna E Lantz

Krist V Gernaey is Associate Professor at the Department of Chemical and Biochemical Engineering, Technical University of Denmark with expertise within modeling of bioprocesses, includes fermentation, biocatalysis, wastewater systems and food production processes.

Ulrich Krühne is Senior Researcher at the Department of Chemical and Biochemical Engineering, Technical University of Denmark. He has more than 10 years experience with microfluidics and CFD modeling.

Mads Orla Albæk performs an industrial PhD with Novozymes and Department of Chemical and Biochemical Engineering, Technical University of Denmark. His PhD work focuses on applying modeling in the context of optimization and improvement of enzyme production processes.

Anna Eliasson Lantz is Associate Professor at the Department of Systems Biology, Technical University of Denmark. Her field of expertise lies within quantitative fermentation physiology and metabolic engineering of industrially important microorganisms, as well as Process Analytical Technology (PAT) projects.

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High-throughput parallel bioprocessing in shaken micro-bioreactors – from clone screening to automated bioprocess development

Dr.-Ing. Frank Kensy, m2p-labs

The presentation will introduce into the BioLector technology and associated technologies. Due to continuous development of new technologies around the BioLector, the BioLector is now a full high throughput fermentation system allowing bioprocess development at microscale. Beside the capabilities of online monitoring of the most relevant fermentation parameters: biomass and fluorescent proteins as well as pH and DO; the system can also be operated in fedbatch mode. Data will be presented from fermentations with different glucose feeding rates and its effect on protein expression with microbial expression systems. Another advancement of the BioLector is the integration in standard liquid-handling systems. The so called RoboLector was developed to perform automated sampling and feeding with the BioLector. Examples will be given which demonstrate the power of the system in exploring induction profiling and fedbatch strategies. In conclusion, we believe that with the currently available microbioreactors a new era of bioprocess development